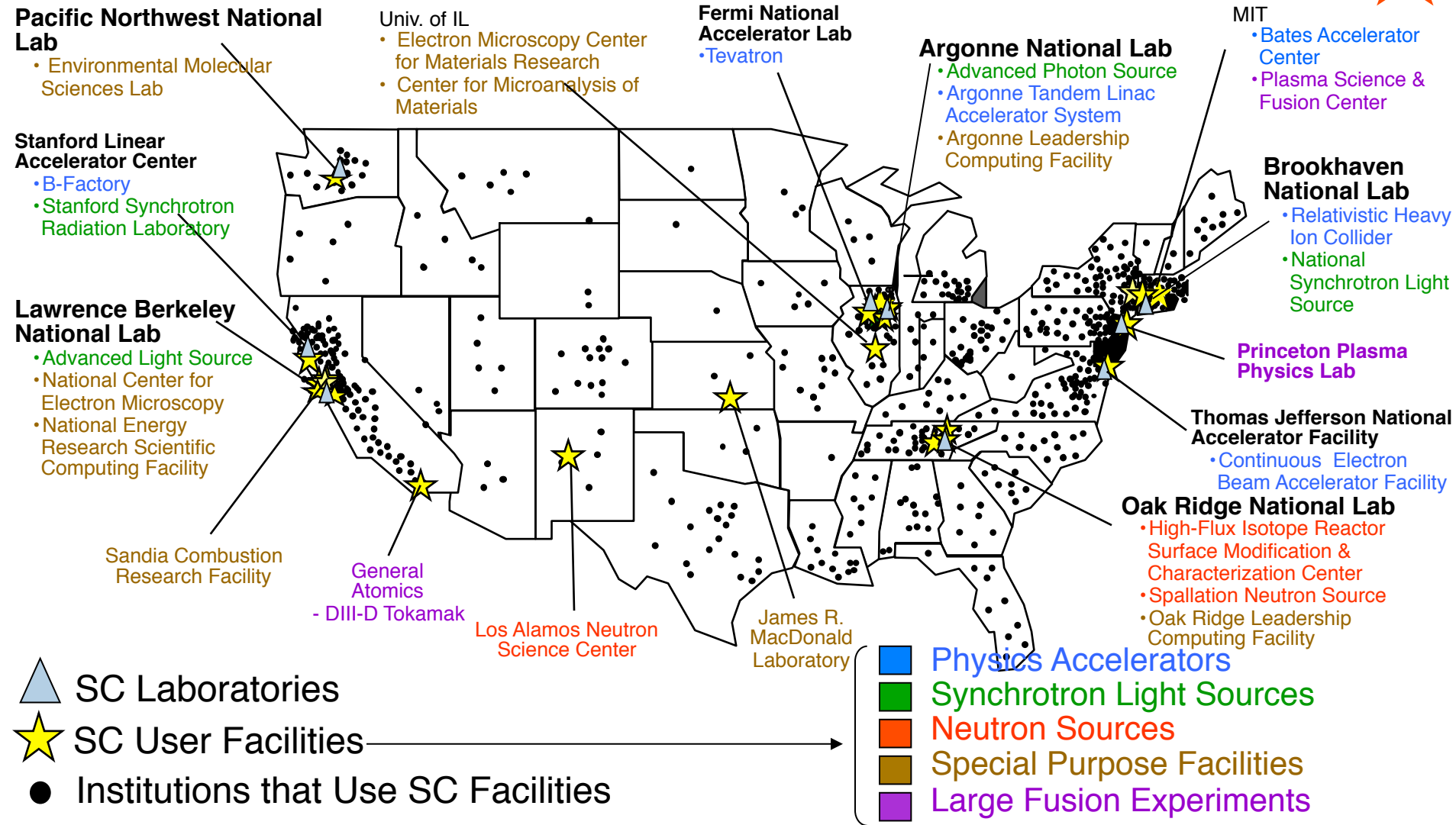


DOE's Office of Science is an enormously complicated distributed system



\$5B/yr supports **26,000** investigators at **300** academic institutions and all DOE laboratories; **27,000** researchers use scientific user facilities

But DOE-SC's vitally important 21st C research is performed on (at best) 20th C infrastructure

DOE investigators and facility users are all information workers, engaged in consuming and producing digital data. Yet:

- The journal article is a primary information exchange method
- The paper notebook is widely used to document research
- The filing cabinet is a primary data storage method
- Most computational results cannot be reproduced
- Email, telephone, airplane are primary collaboration tools
- Security concerns are a frequent obstacle to collaboration
- Much modeling and simulation is performed using spreadsheets and proprietary packages

We must do far better if we are to address 21st Century energy challenges in a timely and effective manner

Imagine a fully digital laboratory system designed to accelerate discovery to 21st Century speeds ...

- All data, code, and documents system-wide are accessible, discoverable, reusable, reproducible, computable, ...
- ... and are linked by a distributed knowledge base that permits automated navigation of content and connections
- Advanced software and computational processes are available on-demand and used routinely by every researcher
- Collaboration occurs within spaces that people want to use even when they are not collaborating
- Intrinsic and proactive security mechanisms encourage rather than discourage collaboration, while protecting against attacks
- These capabilities are as intuitive, flexible, and collaborative as the best consumer software (Amazon, Apple, Google, ...)

